



Attorney's Docket No. SPO-611
MAIL STOP AMENDMENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:) Group Art Unit: 1714
SATO; HIMENO; KAZAMA) Examiner: Tae H. Yoon
Serial No.: 10/088,347)
Filed: March 18, 2002)

For: PHOTO-CURABLE REPARATIVE MATERIAL
FOR DENTAL USE

APPENDIX A

Please amend the claims as indicated according to 37 C.F.R.
§ 1.121 concerning a manner for making claim amendments.

1. (Original) A photocurable dental restorative comprising (i) 100 parts by weight of a polymerizable monomer, (ii) 0.01 to 5 parts by weight of a photopolymerization initiator of acylphosphine oxide, and (iii) 200 to 1900 parts by weight of an inorganic filler, wherein the inorganic filler (iii) is a mixed filler of:

(A) irregular-shaped inorganic particles having an average particle size of not smaller than 0.1 μm but smaller than 1 μm ;

(B) spherical inorganic particles having an average primary particle size of not smaller than 0.1 μm but not larger than 5 μm ; and

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(C) fine inorganic particles having an average primary particle size of not larger than 0.1 μm ;

which are so blended as to satisfy the following mass ratios ① to ③:

$$\textcircled{1} \quad m_A / (m_B + m_C) = 0.2 \text{ to } 3$$

$$\textcircled{2} \quad m_B / (m_B + m_C) = 0.5 \text{ to } 0.99$$

$$\textcircled{3} \quad m_C / (m_B + m_C) = 0.01 \text{ to } 0.5$$

where m_A , m_B and m_C are masses of the inorganic particles (A) to (C).

2. (Original) A photocurable dental restorative according to claim 1, wherein said mixed filler (iii) is obtained by so blending the inorganic particles (A) to (C) as to satisfy the following mass ratios ①' to ③';

$$\textcircled{1}' \quad m_A / (m_B + m_C) = 0.4 \text{ to } 2.3$$

$$\textcircled{2}' \quad m_B / (m_B + m_C) = 0.6 \text{ to } 0.9$$

$$\textcircled{3}' \quad m_C / (m_B + m_C) = 0.1 \text{ to } 0.4.$$

3. (Original) A photocurable dental restorative according to claim 1, wherein in said mixed filler (iii), a maximum size of aggregates of primary particles of the spherical inorganic

particles (B) and a maximum size of aggregates of primary particles of the fine inorganic particles (C) are not larger than 20 μm , respectively, and a total amount of the aggregates thereof is not larger than 20% by volume of the whole mixed filler (iii).

4. (Original) A photocurable dental restorative according to claim 1, wherein said spherical inorganic particles (B) have an average primary particle size of not larger than 1 μm .

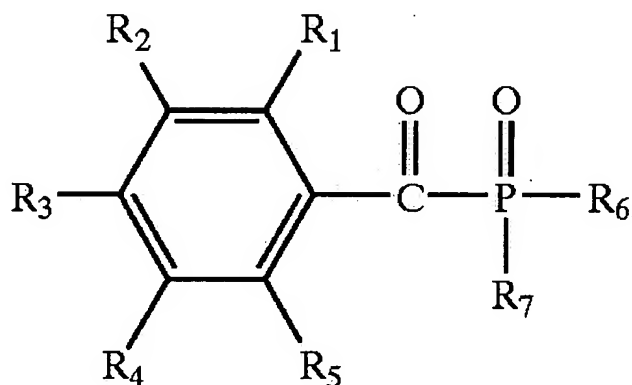
5. (Original) A photocurable dental restorative according to claim 1, wherein said fine inorganic particles (C) have an average primary particle size of from 0.05 to 0.09 μm .

6. (Original) A photocurable dental restorative according to claim 1, wherein said mixed filler (iii) has a volume of the pores of not smaller than 0.08 μm due to strongly aggregated particles of not larger than 0.1 cc/g.

7. (Original) A photocurable dental restorative according to claim 1, wherein said mixed filler (iii) has at least one distribution peak at a position of a particle size of not larger than 0.1 μm and at a position of a particle size of not smaller

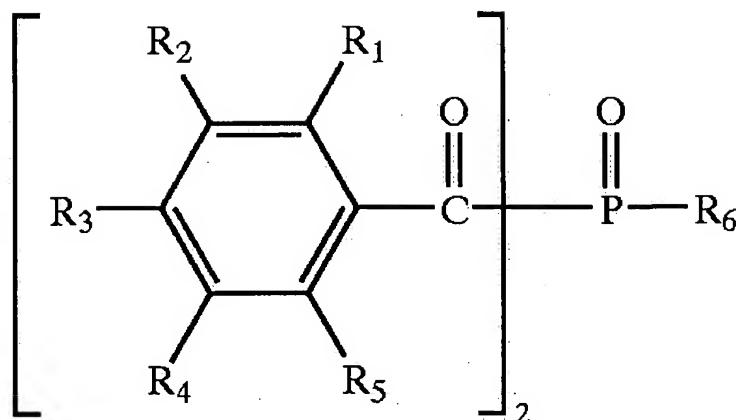
than 0.1 μm but not larger than 1 μm , respectively, on particle size distribution based on the volume of particles, but has no distribution peak at a position of a particle size in excess of 5 μm .

8. (Currently amended) A photocurable dental restorative according to claim 1, wherein said acylphosphine oxide is represented by the following general formula (I) or (II)



(I)

(II)



wherein each of R₁, R₂, R₃, R₄ and R₅ is any one of the groups selected from the group consisting of

- a hydrogen atom,
- a halogen atom,
- an alkyl group,
- an alkoxy group,
- an alkylthio group, and

a substituted or unsubstituted an unsubstituted aryl group or a substituted aryl group substituted by at least one group selected from the group consisting of

- a halogen atom,
- an alkyl group and
- an alkoxy group,

and each of R₆ and R₇ is any one of the groups selected from the group consisting of

~~a substituted or unsubstituted~~ a substituted alkyl
group or a substituted alkyl group substituted by at least
one group selected from the group consisting of

a halogen atom,

an alkyl group and

an alkoxy group,

~~a substituted or unsubstituted~~ a substituted alkenyl
group or a substituted alkenyl group substituted by at
least one group selected from the group consisting of

a halogen atom,

an alkyl group and

an alkoxy group, and

~~a substituted or unsubstituted~~ an unsubstituted aryl
group or a substituted aryl group substituted by at least
one group selected from the group consisting of

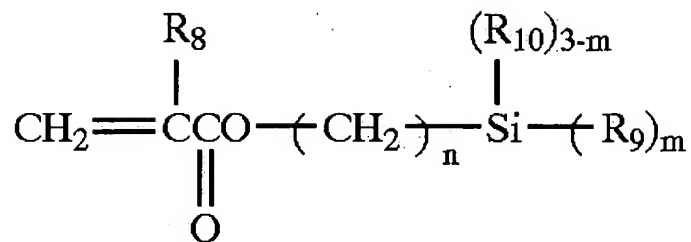
a halogen atom,

an alkyl group and

an alkoxy group.

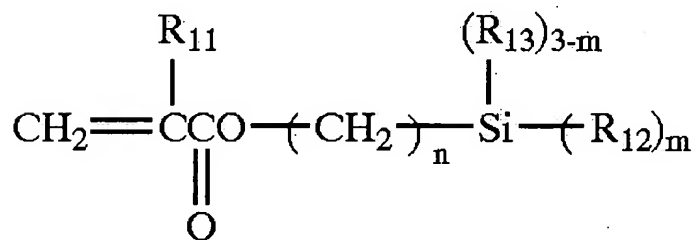
9. (Original) A photocurable dental restorative according to claim 1, wherein said irregular-shaped inorganic particles (A) are treated for their surfaces with a silane coupling agent represented by the following general formula (III),

(III)



wherein R_8 is a hydrogen atom or a methyl group, R_9 is an alkoxy group, a chlorine atom or an isocyanate group, R_{10} is an alkyl group having 1 to 6 carbon atoms, m is an integer of 2 to 3, and n is an integer of 8 to 20, and said fine inorganic particles (C) are treated for their surfaces with a silane coupling agent represented by the following general formula (IV),

(IV)



wherein R_{11} is a hydrogen atom or a methyl group, R_{12} is an alkoxy group, a chlorine atom or an isocyanate group, R_{13} is an alkyl group having 1 to 6 carbon atoms, m is an integer of 2 to 3, and n is an integer of 2 to 3.

10. (Original) A photocurable dental restorative according to claim 1, wherein an amine compound is contained in an amount of from 0.01 to 5 parts by weight per 100 parts by weight of the polymerizable monomer (i).

11. (Original) A method of producing a photocurable dental restorative by preparing an inorganic filler by mixing:

(A) irregular-shaped inorganic particles having an average particle size of not smaller than 0.1 μm but smaller than 1 μm ;

(B) spherical inorganic particles having an average primary particle size of not smaller than 0.1 μm but not larger than 5 μm ; and

(C) fine inorganic particles having an average primary particle size of not larger than 0.1 μm ;

so as to satisfy the following mass ratios ① to ③:

$$\textcircled{1} \quad m_A / (m_B + m_C) = 0.2 \text{ to } 3$$

$$\textcircled{2} \quad m_B / (m_B + m_C) = 0.5 \text{ to } 0.99$$

$$\textcircled{3} \quad m_C / (m_B + m_C) = 0.01 \text{ to } 0.5$$

where m_A , m_B and m_C are masses of the inorganic particles (A) to (C),

and by mixing 100 parts by weight of a polymerizable monomer, 0.01 to 5 parts by weight of a photopolymerization initiator of

acylphosphine oxide, and 200 to 1900 parts by weight of said inorganic filler.

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